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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/559,142      | 12/01/2005  | Moon-kyoon Chun      | NEK-0015            | 9045             |

23413 7590 03/05/2007  
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| EXAMINER |
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LISTVOYB, GREGORY

|          |              |
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| ART UNIT | PAPER NUMBER |
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1711

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE  | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS                               | 03/05/2007 | PAPER         |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                                      |                                    |  |
|------------------------------|--------------------------------------|------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/559,142 | <b>Applicant(s)</b><br>CHUN ET AL. |  |
|                              | <b>Examiner</b><br>Gregory Listvoyb  | <b>Art Unit</b><br>1711            |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>      </u> | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

Claims 1-3, 5-8, 10, 12-13, and 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Oshida et al (JP publication 06-056921) herein Oshida in combination with Kurosawa (JP publication 2001-329021), herein Kurokawa.

Oshida discloses a method for manufacturing imide-substituted polymer comprising the following steps:

1. Reaction of 60-90%wt of aromatic vinyl monomer (for example, Styrene, lines 0007 and 0009) and 10-40 % wt of unsaturated dicarboxylic anhydride (for instance, maleic, line 0009) in methyl ethyl ketone at the presence of 0.011% wt initiator (line 0021) at 150C.
2. Separation step performed by supplying the polymerized solution discharged from the step (1) into a separator and then removing unreacted monomers and solvent at 200C and 50 Torr (line 0022).
3. Reaction of continuously supplying melt from step (2) into imidization reactor, containing Aniline (line 0023)
4. Drying step to remove volatiles.

Oshida does not teach that imidization reaction (step 3) takes place at the present of solvent and catalyst.

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Kurokawa discloses a multi step method for production of imidized polymer, where imidization step takes place in in Metylisobutyl ketone at the presence of triethylamine (Example 1). The presence of solvent provides more uniform imidization, since all the acidic groups of maleic anhydride equally expose to a primary amine. The catalyst increase the rate of imidization

Therefore, it would be obvious to a person with ordinary skills in the art to use a solvent and a catalyst in imidization.

Claims 1,4, 9,11 and 14-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa in combination with Oshida.

Kurosawa discloses a multi step method for production of imidized polymer, where imidization step takes place in Methylisobutyl ketone at the presence of triethylamine (Example 1).

Regarding claim 4, Kurosawa discloses 0.001-1%wt of initiator, which is of 1,1 bis (tret-butyl-peroxy) cyclohexane.

Regarding Claim 9, Kurokawa teaches 60 % wt of Metylisobutyl ketone in the first reaction step.

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In reference to claim 11, reaction temperature in the reactor gradually increases from 85 to 140C (Example 1).

In reference to Claim 14, the molar ratio between maleic anhydride and aniline is within the range of 0.1-0.9 (Example 1).

In reference to claims 15 and 16 the ratio of triethylamine to aniline is 3/97 (Example 1)

Regarding claim 18 and 19, imidization takes place at 140C (Example 1) and devolatilization occurs at 310C and 30 torr (Example 1).

In reference to Claim 20, conversion of unsaturated carboxylic acid is 95% or more (Line 005).

In reference to claim 22, MWD of the final polymer is between 2 and 3. It suggests that the polymer is unimodal styrene-maleinate copolymer.

In reference to claim 21, since the Kurokawa's reaction conditions are similar to one in the application, Kurokawa's process completes at the same time as one in the Application.

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Kurokawa does not teach a separation step between polymerization and imidization.

Oshida teaches the above separation step. Separation of unreacted monomer and solvent is economically beneficial, since they can be returned into the first step of the process without any additional separation.

Therefore, it would be obvious to a person with ordinary skills in the art to include a separation step between polymerization in Kurokawa's process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory Listvoyb whose telephone number is (571) 272-6105. The examiner can normally be reached on 9am-6pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gregory Listvoyb  
Examiner  
Art Unit 1711

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James J. Seidleck  
Supervisory Patent Examiner  
Technology Center 1700